ICARDA

Science for resilient livelihoods in dry areas

Decision Support Tool for Sustainable Land Management: Integrating Stakeholders and WEFE Nexus

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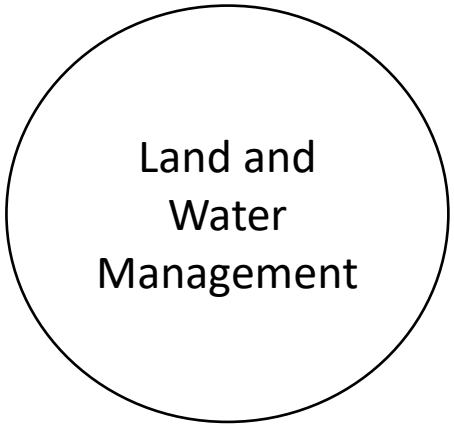
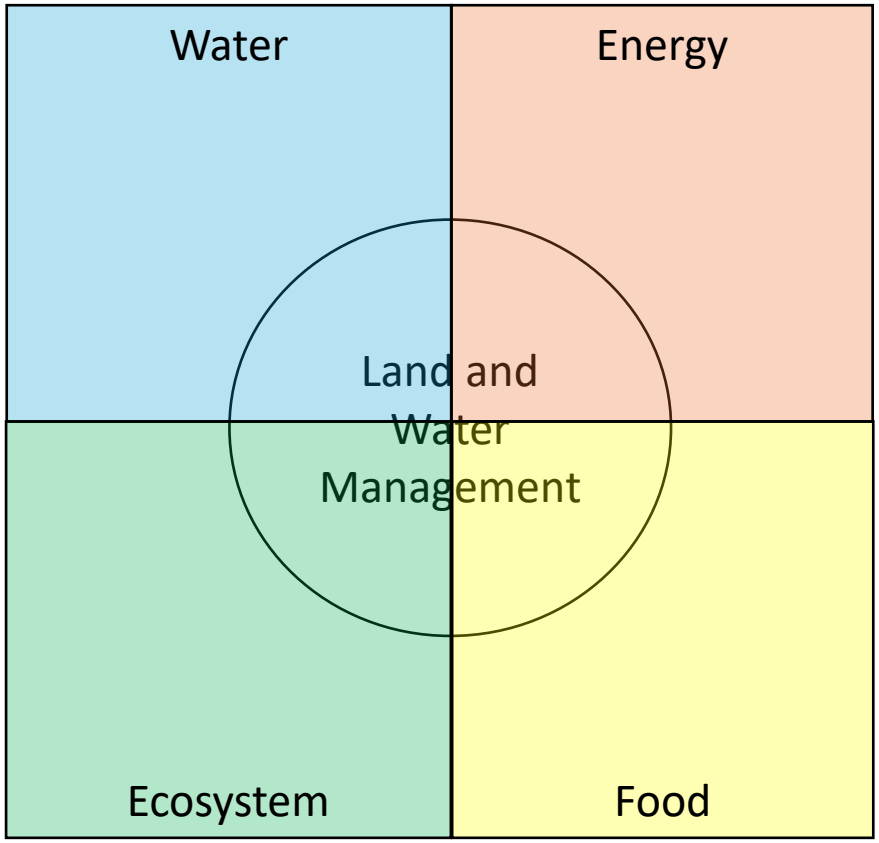
Presentation outline

1. WEFE Nexus and Stakeholders
2. The DST-framework
3. Weights results

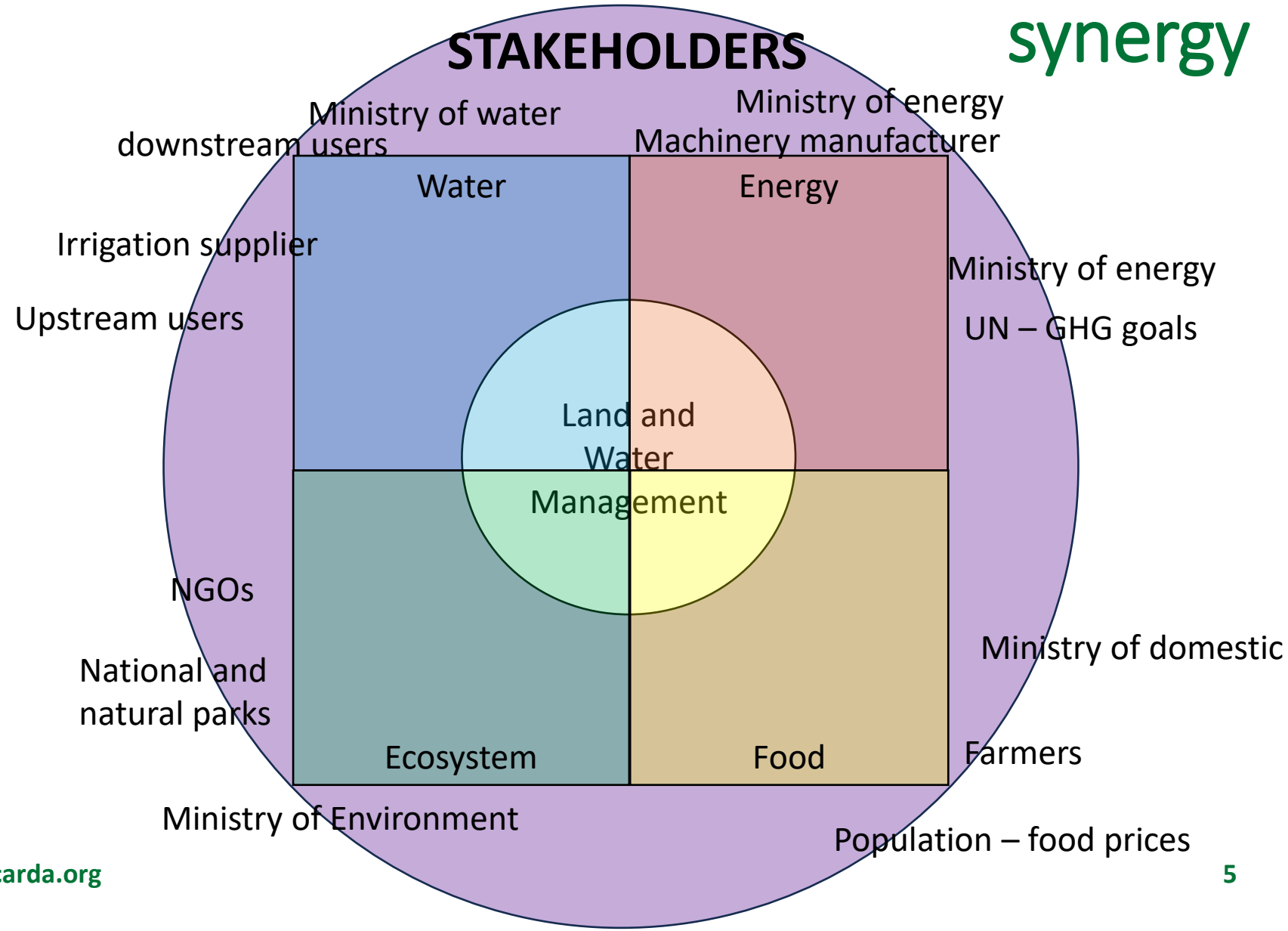
WEFE for stakeholder alignment and synergy



WEFE for stakeholder alignment and synergy



WEFE for stakeholder alignment and synergy



WEFE Nexus for stakeholder alignment and synergy

- Land and Water Management affects a multitude of stakeholders
- Often, there are contradicting interests and policies
- How to find opportunities for collaborations and synergies?
- WEFE concept as a powerful and holistic concept that allows us to understand stakeholder priorities

The Decision Support Tool

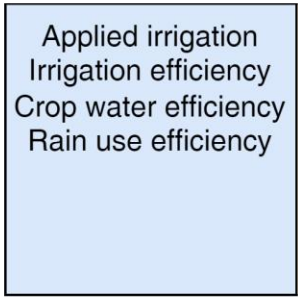
- Before going into the concept. What are the *design criteria* for the tool??
- Tool was preferred over e.g., a policy brief because:
  - —Tool is dynamic, allowing for adapting to the specific context
  - —Tool is repeatable, making it well suitable for multiple sessions

- The DST is simple-to-use and excel-based. Excel based is preferred because:
  - —It is assumed that the majority of people are experienced in excel hence not unnecessary learning curve;
  - —Excel is assumed to be sustainable because it will be maintained (even after this projects ends), which is typically not the case for specifically created apps within projects.

DST: analytical framework

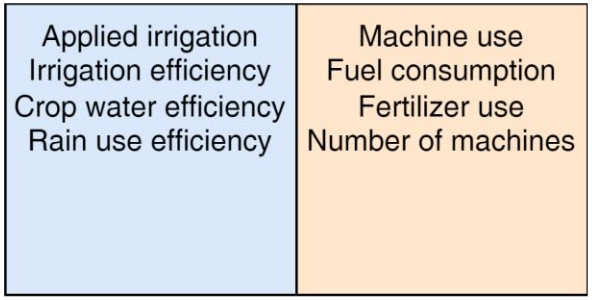
- Include stakeholders as their support is essential for the success
- Frame decision of land management as Multi-Criteria-Decision-Making (MCDM)
- *"Multicriteria Analysis can be defined as the study of methods and procedures by which concerns about multiple conflicting criteria can be formally incorporated in a decision making process"* (International Society on MCDM, 2004)

Analytical framework

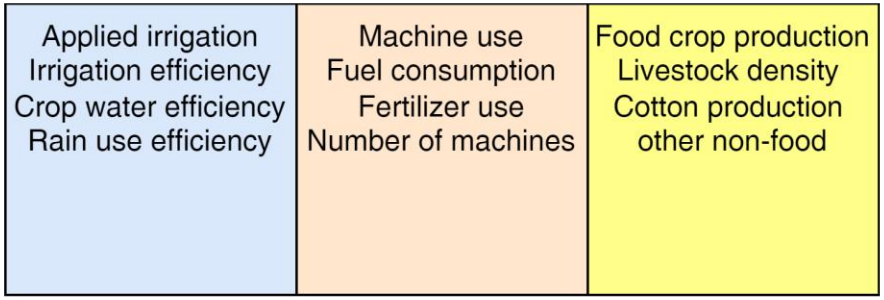


Water prioritization

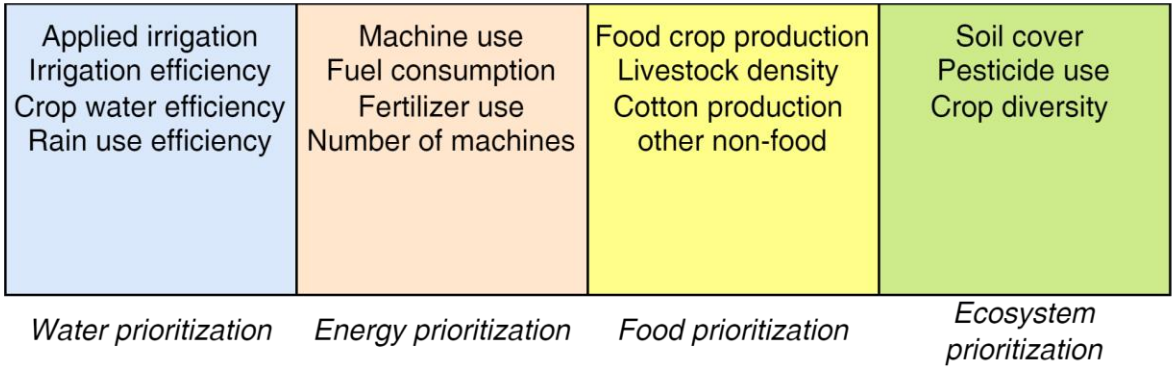
Analytical framework



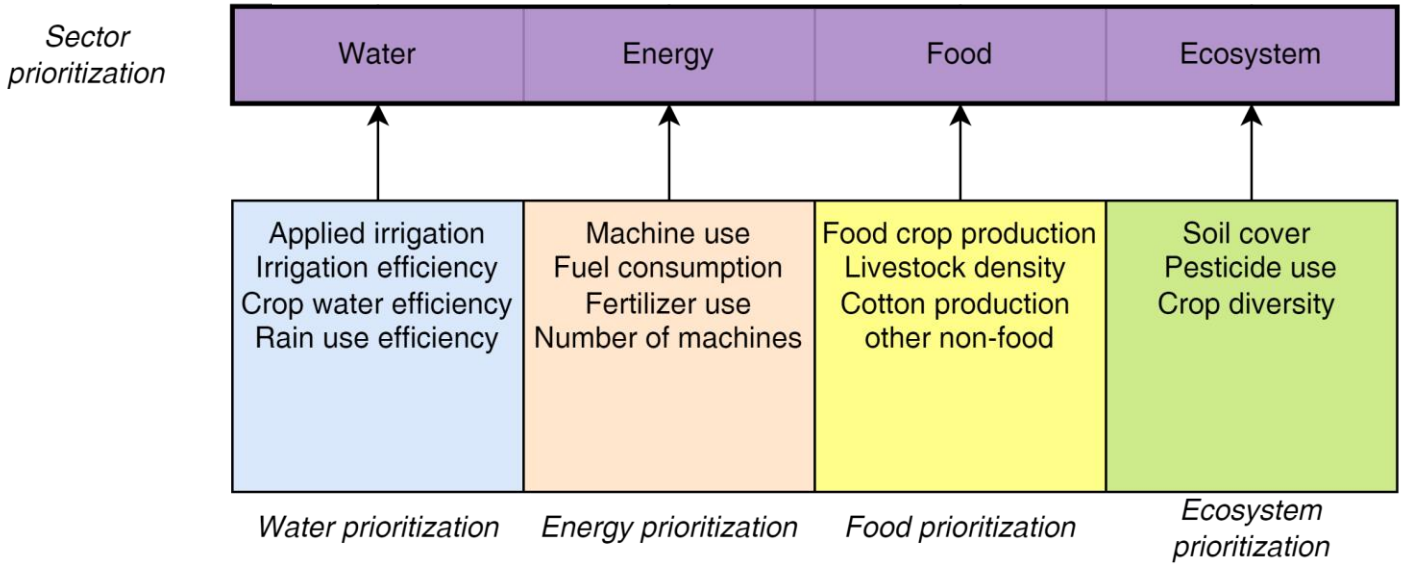
Analytical framework



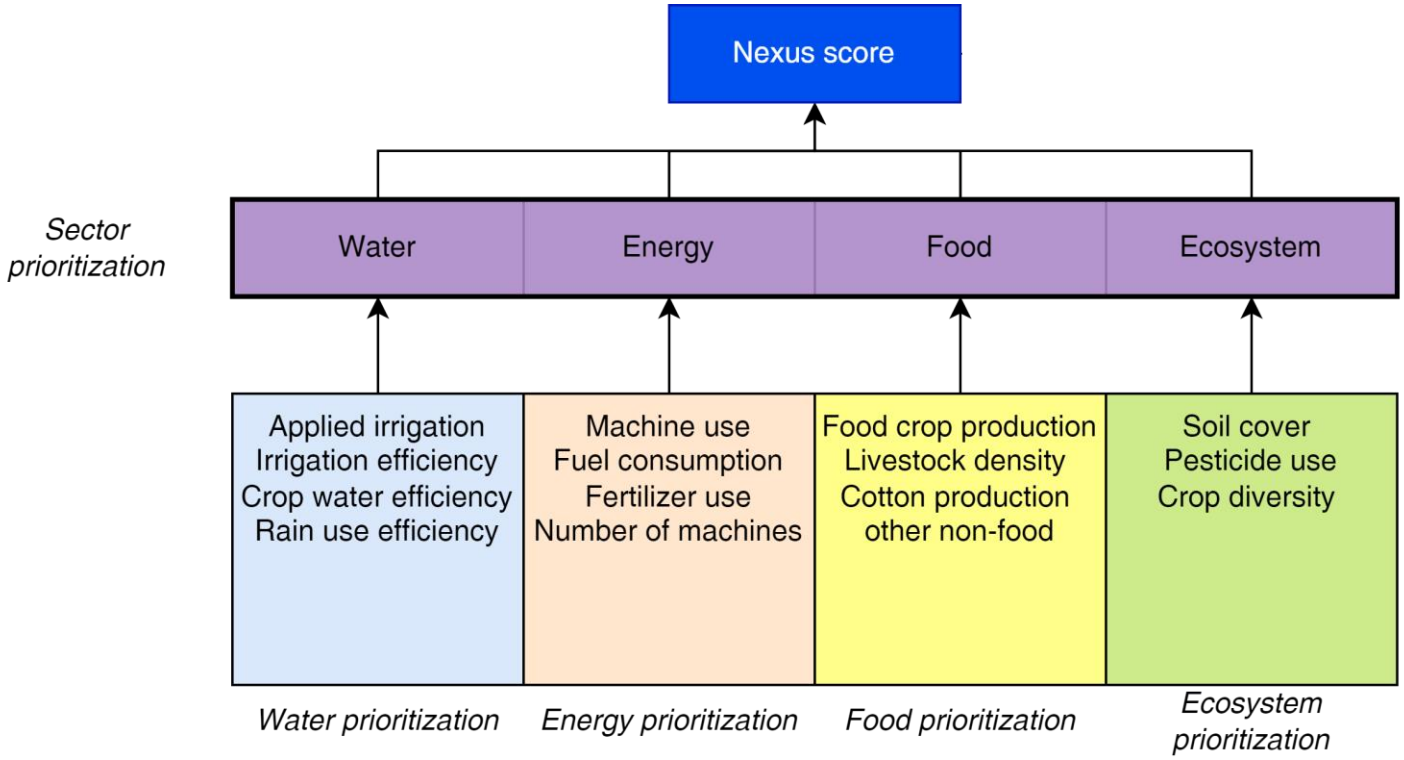
Analytical framework



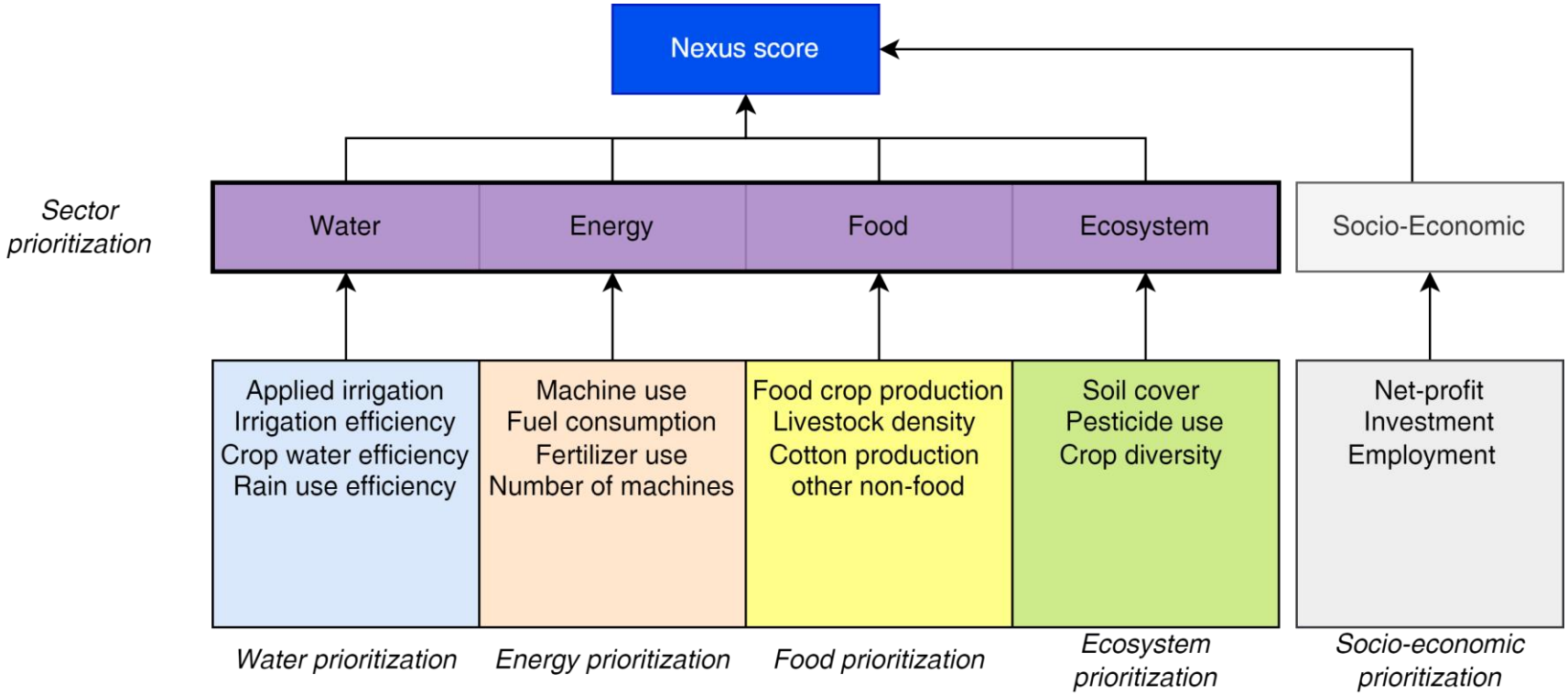
Analytical framework



Analytical framework

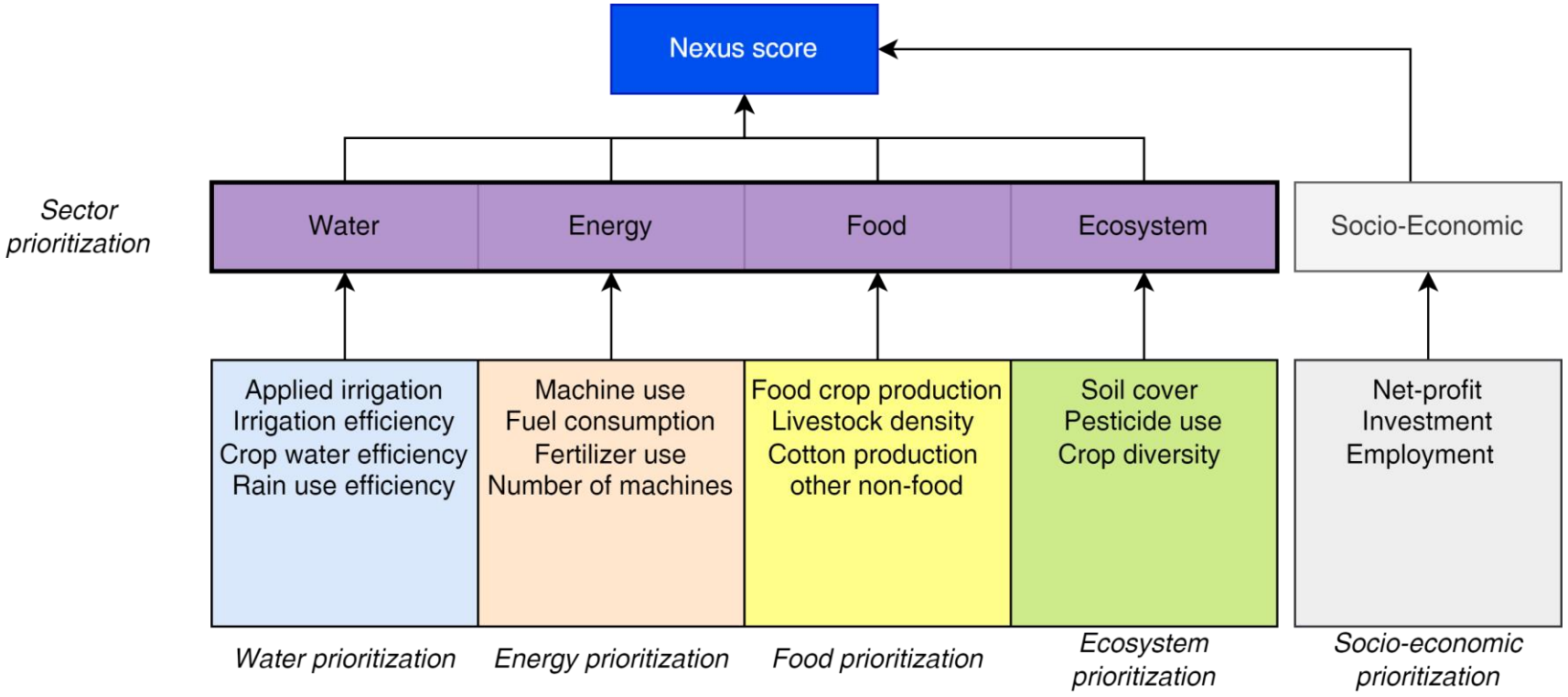


Analytical framework



Analytical framework

- So, we used a certain set of indicators in order to give body and meaning to the WEFE Nexus, based on literature.

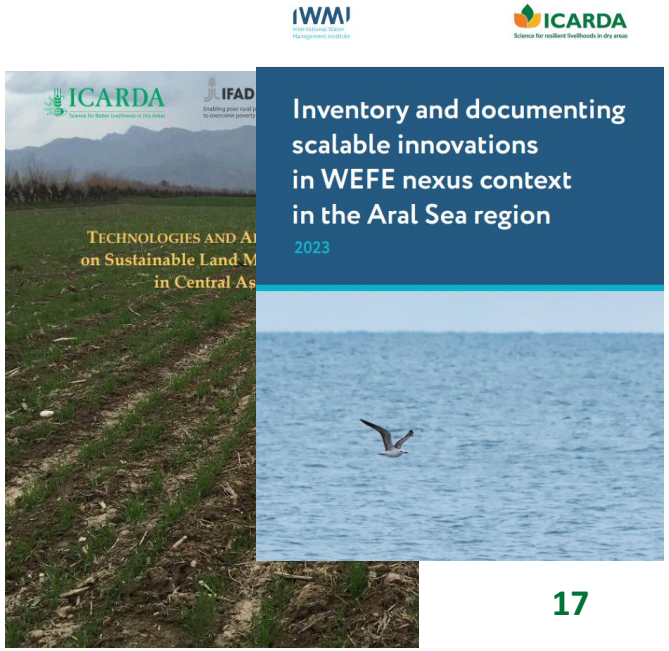


Indicators values of good practices

- We conducted an extensive field campaign to collect the aforementioned indicator values for existing good practices in Uzbekistan and Central Asia
- Selection of SLM technologies was made based upon WOCAT repository, the UNCCD's recommended global database

WOCAT

World Overview of Conservation Approaches and Technologies



Indicators values of good practices

- We conducted an extensive field campaign to collect the aforementioned indicator values for existing good practices in Uzbekistan
- We ranked them from 0-9
  - —0: Very negative (high pesticide use, high fuel use, low irrigation efficiency)
  - —9: Very positive (low machine use, high employment, high rain use efficiency)

#	SLM	Water				Energy				Food				Ecosystem			Socio-economics		
		Applied irrigation	Irrigation efficiency	Crop water efficiency	Rain use efficiency	Machine use	Fuel consumption	Fertilizer use	Number of machines	Food (crop) production	Livestock density	Cotton production	Other non-food production	Soil cover	Pesticide use	Crop diversity	Net-profit	Investment cost	Employment
1	Improved sprinkler with mungbean	6	7	9	2	9	9	9	6	1	0	0	7	0	9	0	1	0	0
2	Improved sprinkler wheat	4	7	6	2	9	8	6	6	4	0	0	0	0	6	0	1	2	8
3	Screened furrow irrigation with perforated polyethylene film	3	7	1	2	6	7	5	6	6	0	5	0	0	9	0	1	5	4
4	Alternate furrow irrigation	3	4	1	2	6	7	6	6	0	0	4	0	0	6	0	8	8	4
5	Laser assistend land levelling	5	4	6	2	4	3	4	4	7	0	1	0	0	6	0	1	2	8
6	Drip irrigation in Kamashi	6	8	1	2	6	7	6	6	0	0	4	0	0	6	0	2	2	4
7	Winter wheat in interrows in cotton	2	2	1	2	5	6	7	6	5	0	3	0	0	7	0	7	7	4
8	Multi-layerd furrow irrigation	6	4	1	2	7	7	6	6	0	0	3	0	0	5	0	3	7	4
9	Conservation agriculture	9	9	7	9	8	9	9	6	2	0	0	0	0	6	0	1	8	8
10	Artesian mineralized water for irrigated agriculture	6	0	3	7	6	7	7	3	2	0	3	0	0	9	0	1	3	6
11	Licroice growing as remidiation of saline soils	1	2	0	1	6	7	8	9	9	0	0	0	0	9	0	1	8	9
12	Pistachio	1	8	8	9	6	7	8	9	9	0	0	0	0	7	0	1	1	8
13	Pasture rotation	8	7	7	9	8	9	9	9	0	7	0	8	7	8	6	7	9	1
14	Wheat rise production for enhancing productivity	5	4	2	7	7	6	6	0	0	0	0	0	0	5	0	0	7	4
15	Establishing seed farming plots for perennial grasses	0	0	0	9	9	9	0	0	0	0	0	1	0	9	0	0	7	5
16	from pasture to fruit and fodder plots	1	1	6	5	9	9	7	0	5	0	0	0	0	8	0	0	2	7
17	Watermelons sowing in rainfed and deeply loosened strips	0	0	0	9	8	8	8	0	9	0	0	0	0	7	0	0	8	5
18	Drouht resistant oilseed and forage (safflower)	0	0	9	9	9	9	0	0	0	0	0	1	0	9	0	0	7	3
19	Greenhouse thermos	1	9	9	0	9	9	8	0	9	0	0	0	0	9	0	8	2	3
20	Composting	4	1	7	2	8	8	7	0	9	0	0	0	0	7	0	0	4	4
21	Irrigation using polyethylene bottles	1	7	9	3	9	9	5	0	9	0	0	0	0	9	0	1	5	5

Weighing

- Besides indicator values, the understanding of stakeholder priorities is key.
- This can be found it through weighing
- Several methodologies exist:
  - —Direct ranking: distributing points over the indicators
    - Most simple, but prone to equalizing bias)
  - —Saaty pairwise comparisons: comparing each indicator to another
    - Most common used, but requires a lot of time due to high number of comparisons
  - —Best Worst Method (BWM): comparing each indicator to the Best and to the Worst
    - Newest method: simple but no bias; less comparisons than Saaty
- In a second field campaign, people from the Water, Energy, Food, and Ecology Departments were interviewed with the three aforementioned weighing methods.

Weighing

- Besides indicator values, the understanding of stakeholder priorities is key.
- This can be found it through weighing

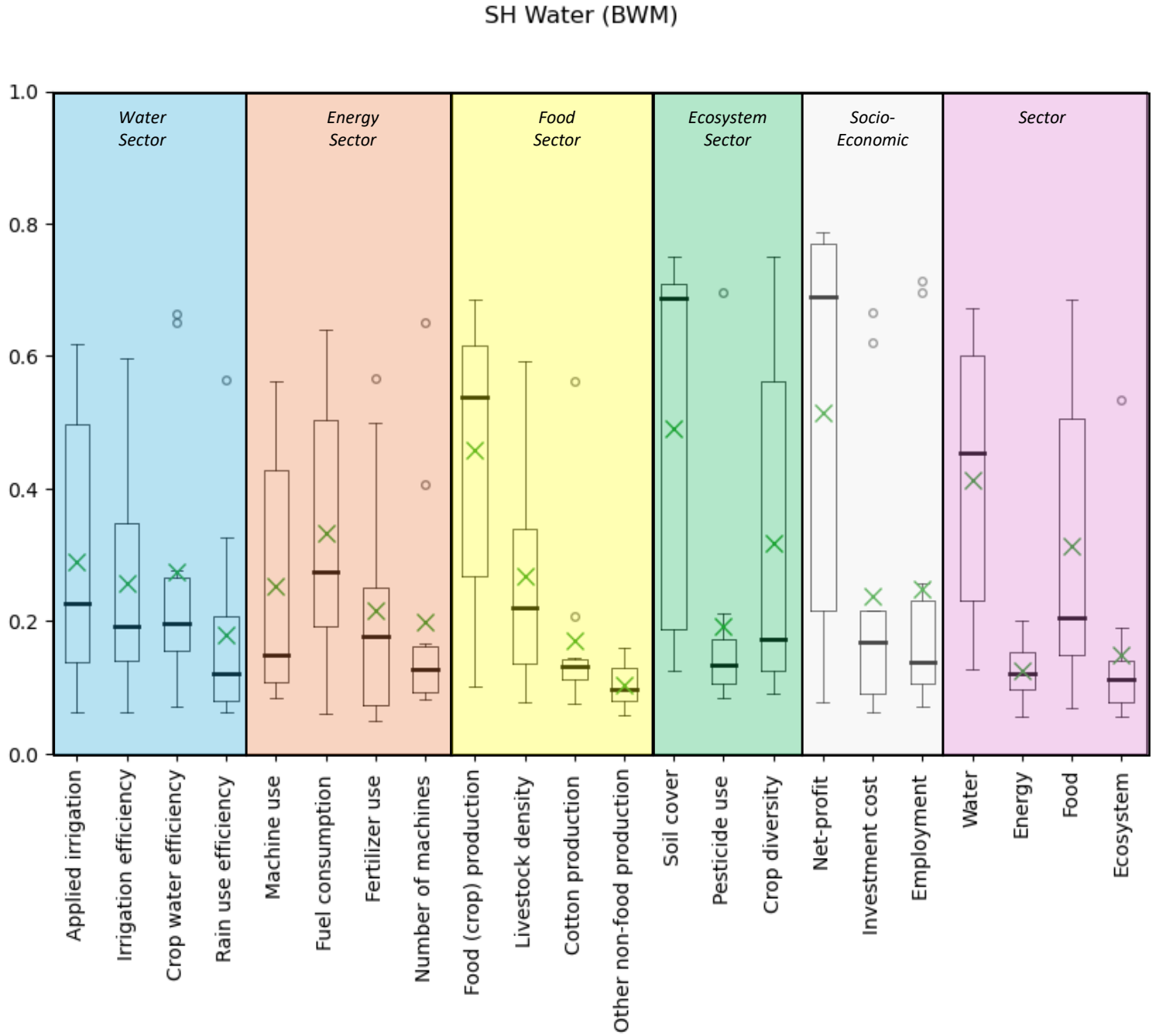
Sector/department	Number of respondents
Water	10
Energy	9
Food	7
Ecosystem	10
Total	*36*

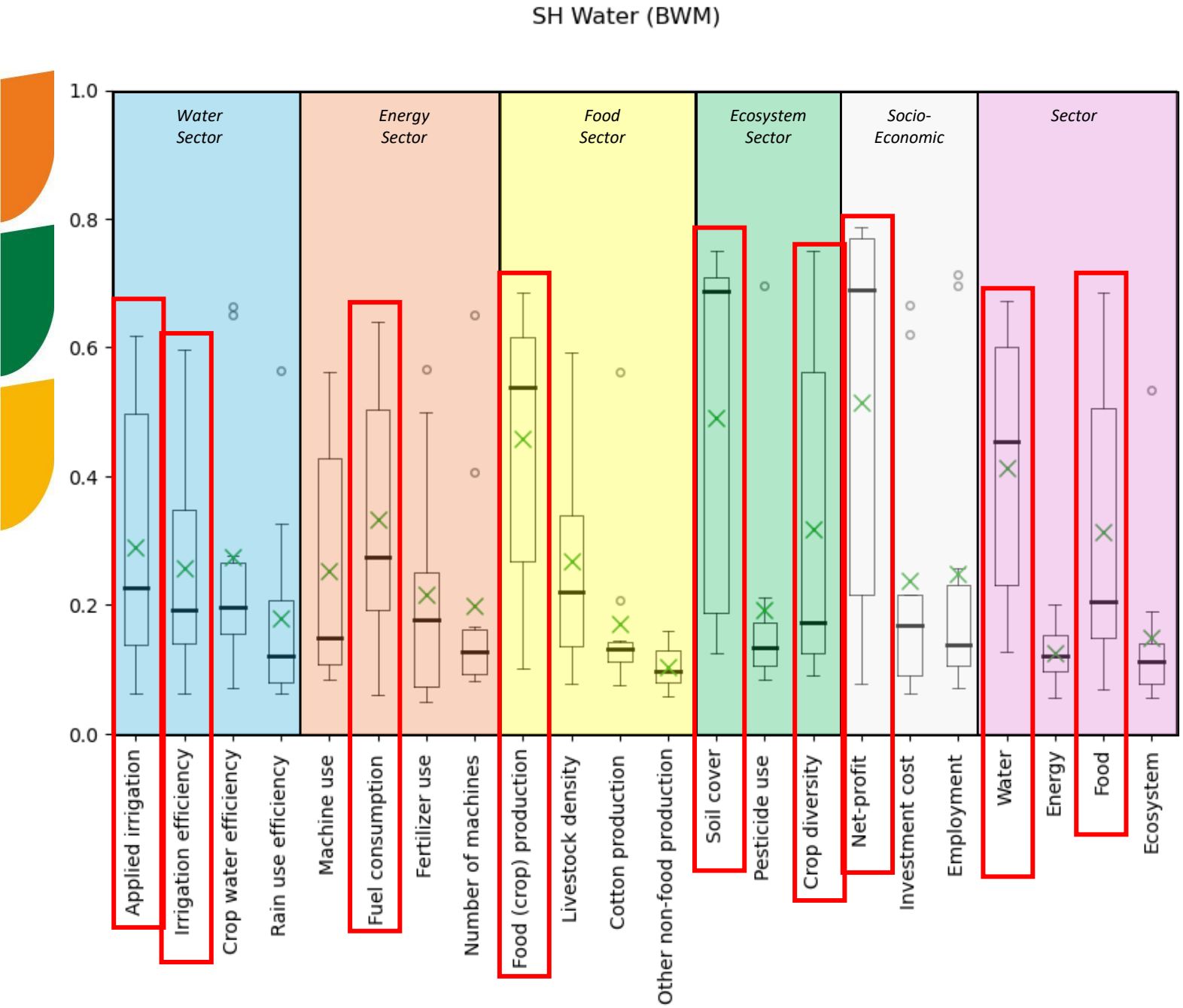
Saaty

- In a second field campaign, people from the Water, Energy, Food, and Ecology Departments were interviewed with the three aforementioned weighing methods.

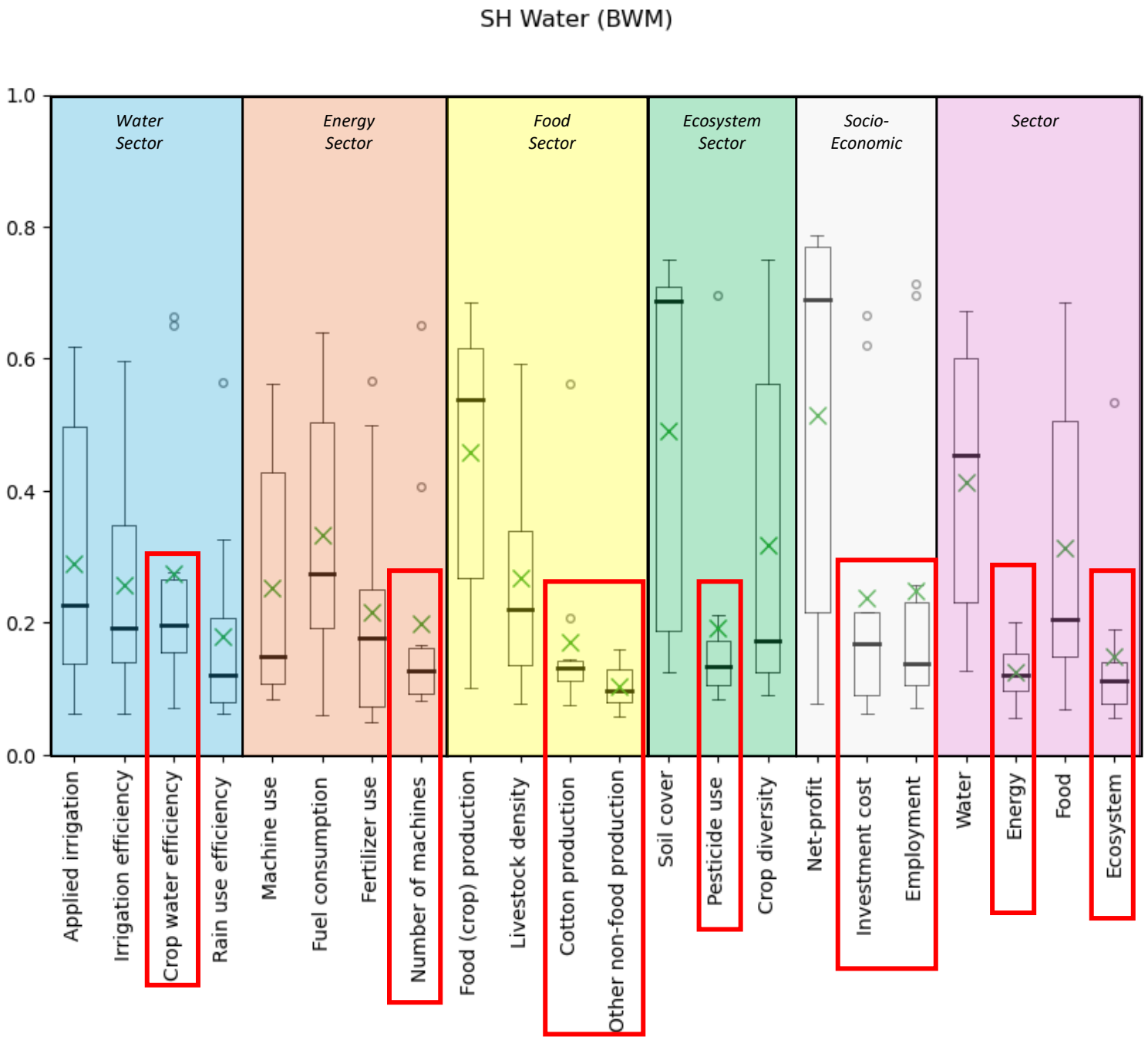
Weighing results

- We looked at the results in two steps:
  - —Within a department (we take water department as example for today)
  - —Across departments


SH Water (BWM)
1.0
0.8
0.6
0.4
0.2
0.0
Water Sector
Energy Sector
Food Sector
Ecosystem Sector
Socio-Economic
Sector
Applied irrigation
Irrigation efficiency
Crop water efficiency
Rain use efficiency
Machine use
Fuel consumption
Fertilizer use
Number of machines
Food (crop) production
Livestock density
Cotton production
Other non-food production
Soil cover
Pesticide use
Crop diversity
Net-profit
Investment cost
Employment
Water
Energy
Food
Ecosystem



- Very high spread for some indicators;
- i.e., no common vision on what is focus or target;
- Within units there are varying priorities for the WEFE Nexus, water and land management



Low spread

Common priority

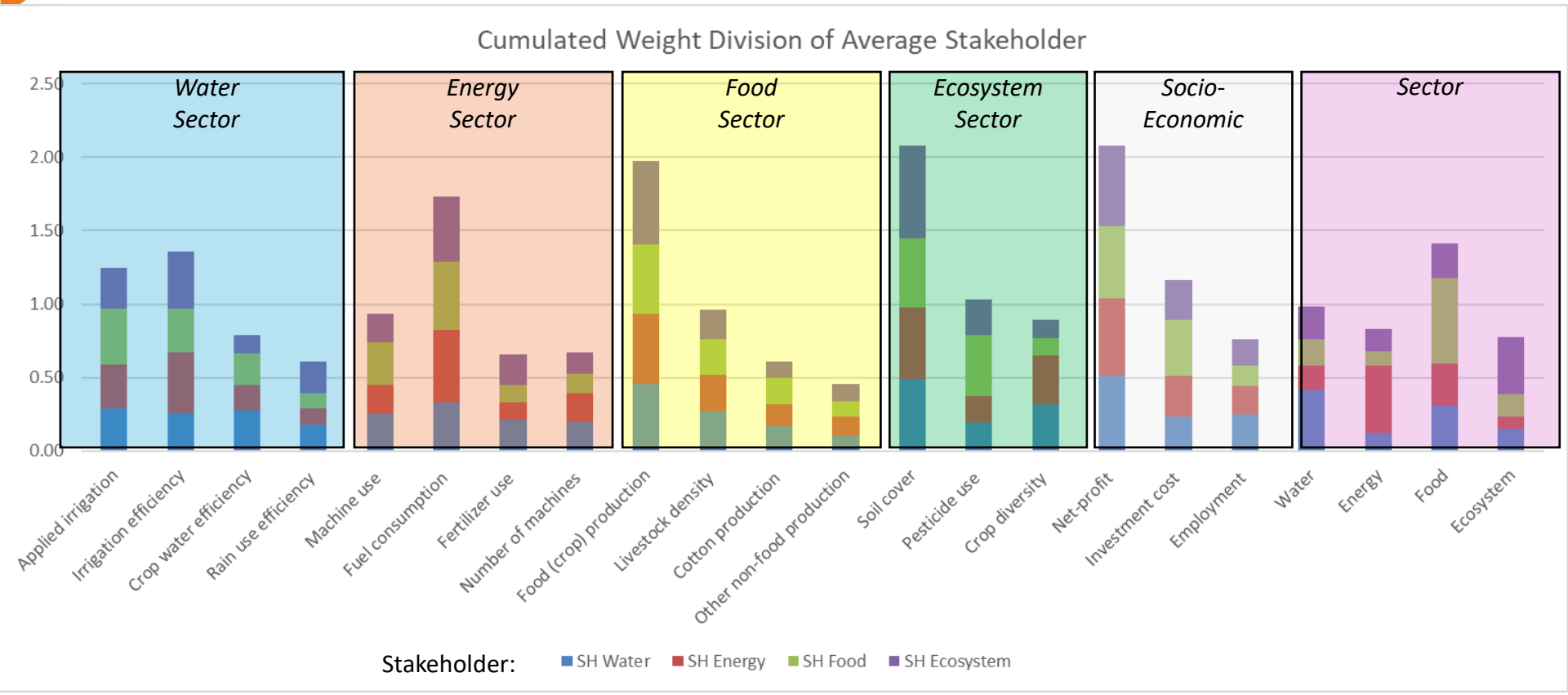
Within department

- Within one department we observe prioritization of WEFE components and indicators very differently

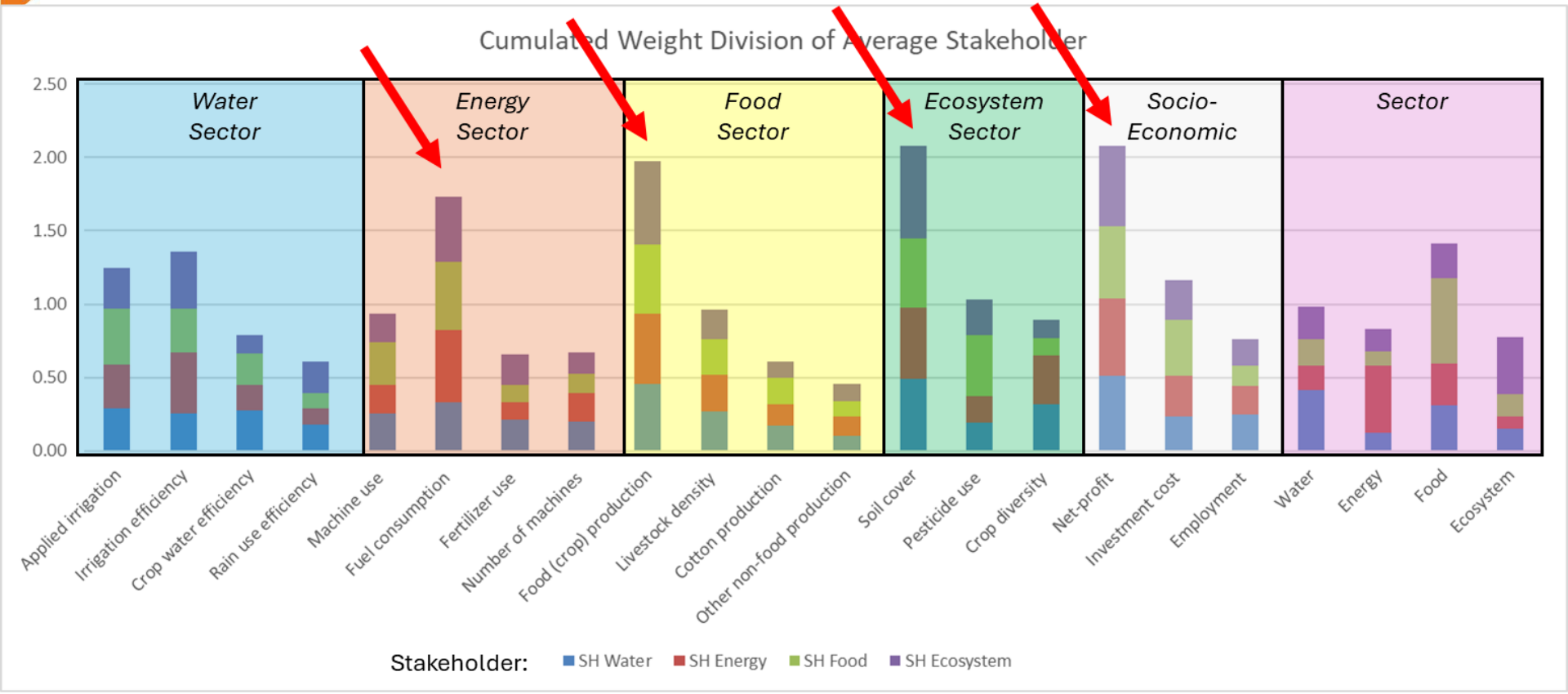
But how about across departments

- Average the individual respondents of a specific sector;
- The following graphs show the sum of average weight per department.

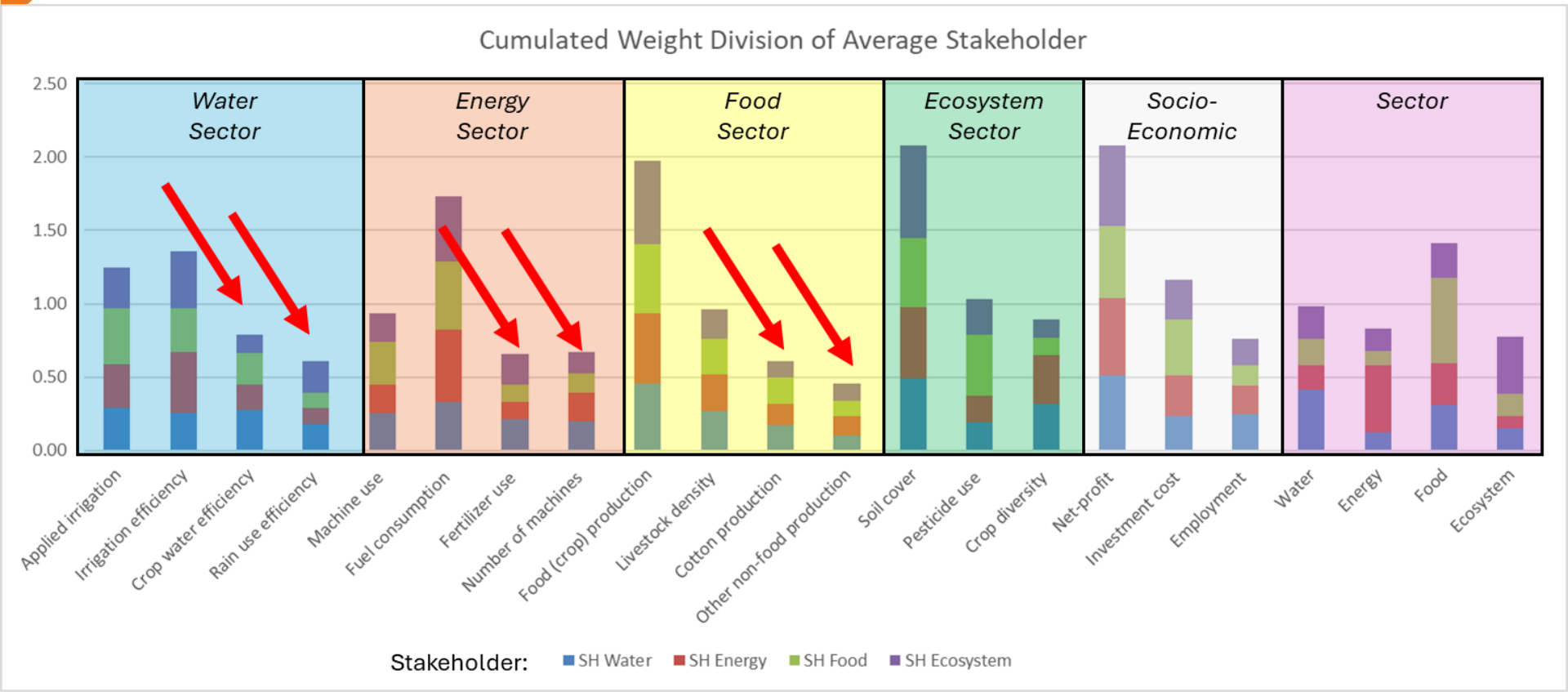
But how about in between organizations



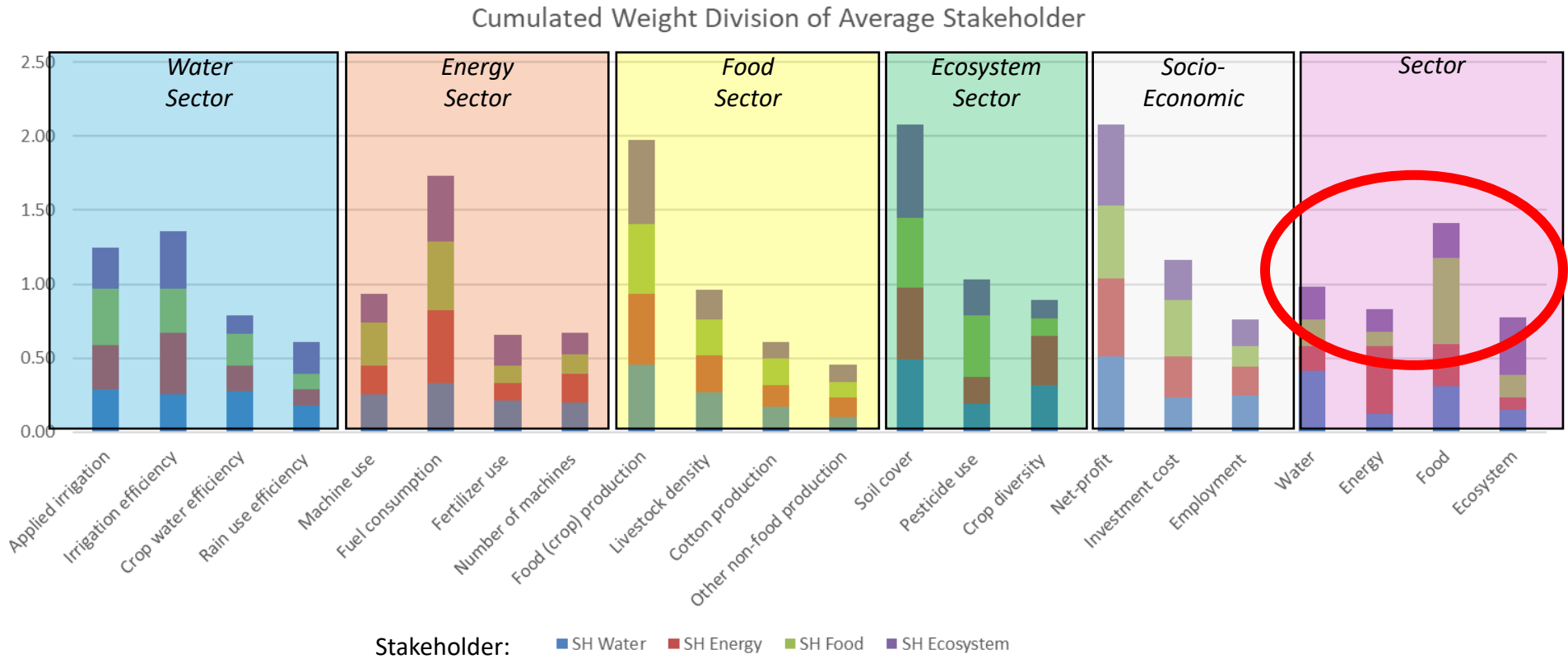
Synergies / collective priorities



Collective ‘not so much interested’



Each WEFE sector is considered important



But how about across departments

- We saw that some WEFE indicators were collectively low prioritized, and others were collectively high prioritised.

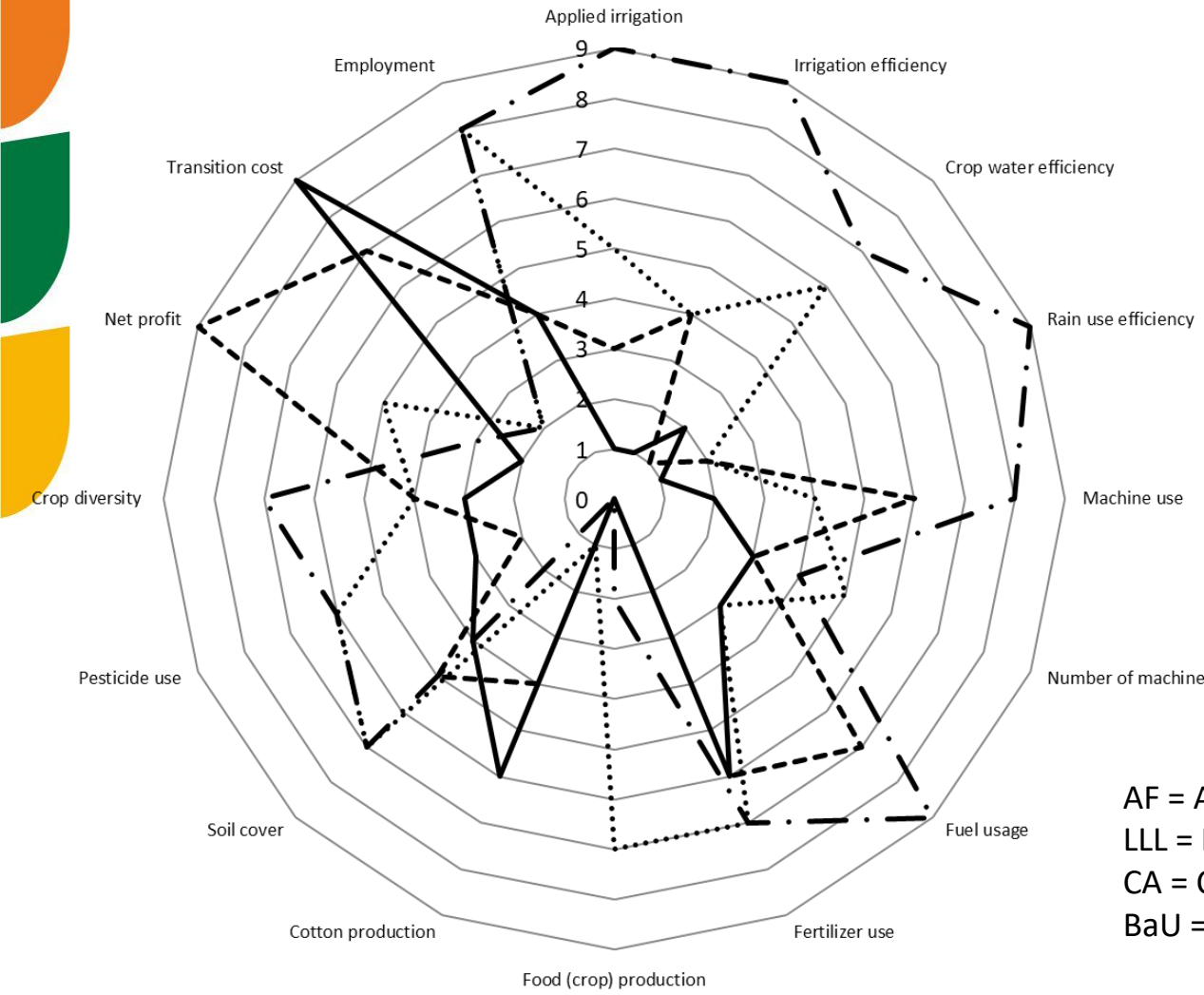
  ⟶ Opportunities for synergizing policies and collaboration

- For the other WEFE indicators, coordination between departments is advisable to avoid contradicting policies

So, what do these weights mean?

- The combination of the weights and the indicator values gives an indication on how a stakeholder would perceive a SLM
  - —Hence combination of importance to the stakeholder and SLM performance

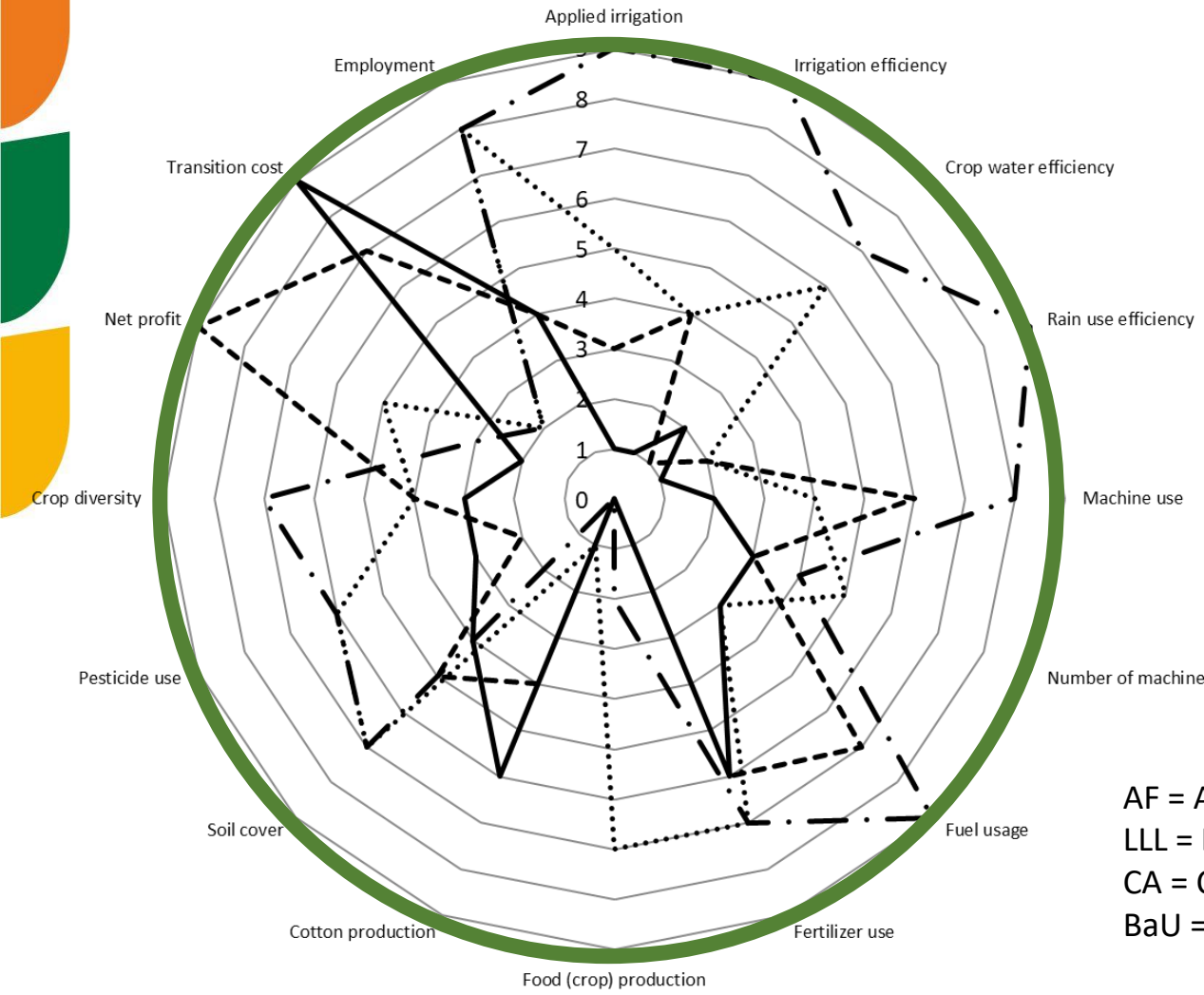
SLMs ranking (indicator values)



Spider graph to visualize the indicator ranks of the 4 SLM technologies/scenarios

AF = Alternate furrowing
LLL = Laser-assisted Land Levelling
CA = Conservation Agriculture
BaU = Business as usual (intensive cotton)

SLMs ranking (indicator values)



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Outside = high rank = Good!

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Spider graph to visualize the indicator ranks of the 4 SLM technologies/scenarios

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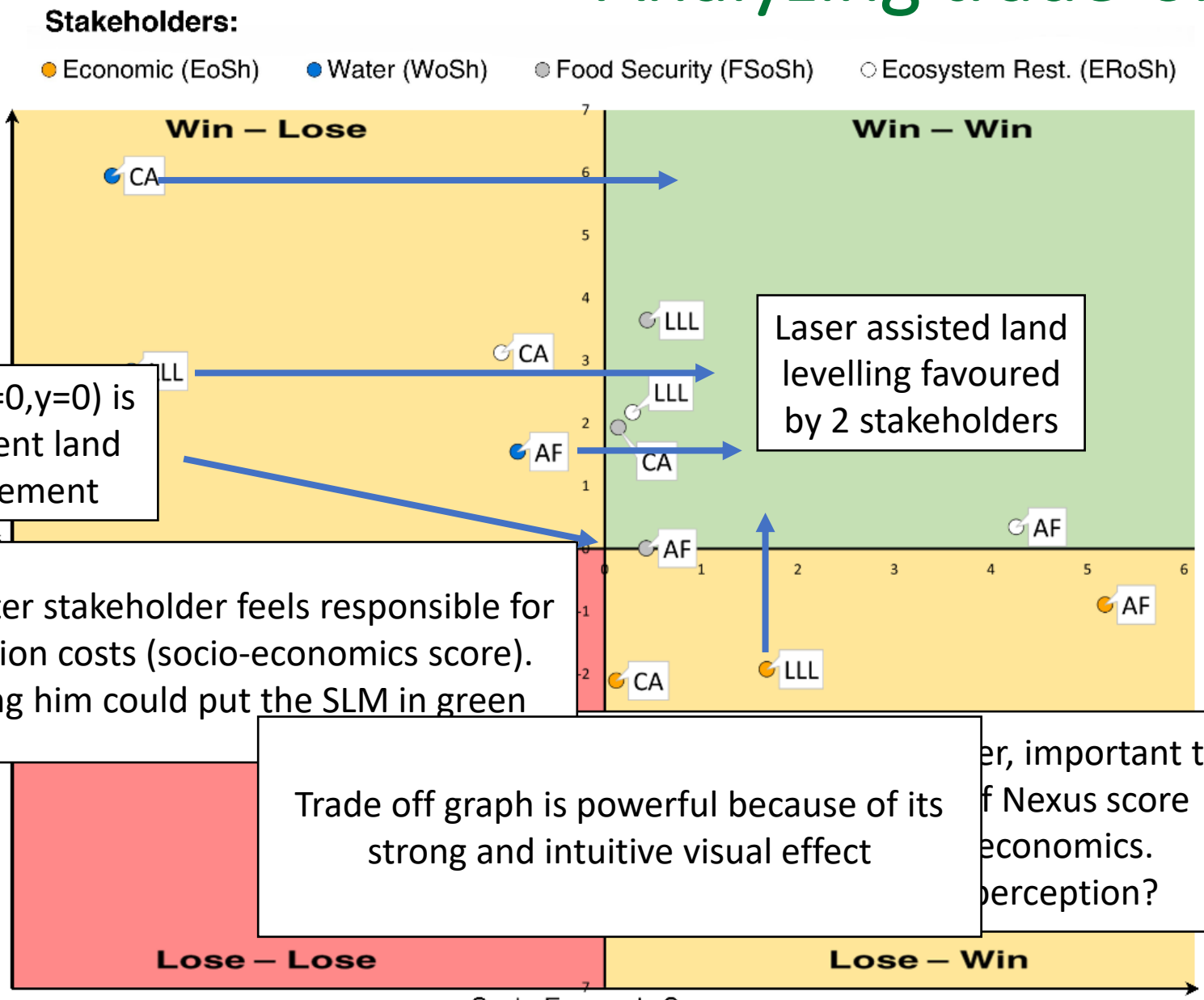
Outside = high rank = Good!
Center = low score = bad!

Analyzing trade-offs



Thank you!
Any questions?

DST is to find synergies between stakeholders and facilitate social learning to scale Sustainable Land Management.
— A System Approach using the WEFE Nexus

J.verbist@cgiar.org

"It is a very relevant and supportive tool to facilitate decision-makers with evidence-based SLM options. It is unique in that it integrates water, energy, food and environmental aspects in implementing SLM practices."
– Comment made by one the present participants